I Claim:

1. A microstructure, comprising:

   a first finger including a length, a first surface and a second surface, said first finger capable of supporting a voltage potential between said first and second surfaces; and

   a second finger capable of moving with respect to said first finger between said first and second surfaces upon application of a voltage to said second finger.

2. A microstructure as recited in claim 1, further comprising a first voltage source for supplying a voltage to said first surface of said first finger.

3. A microstructure as recited in claim 2, further comprising a second voltage source for supplying a voltage to said second surface of said first finger.

4. A microstructure as recited in claim 3, further comprising a third voltage source for supplying a voltage to said second finger.

5. A microstructure as recited in claim 4, wherein the magnitude of said voltage supplied by said third voltage source is significantly greater than said voltage supplied by said first and second voltage sources.

6. A microstructure as recited in claim 4, wherein the magnitude of said voltage supplied by said third voltage source is at least ten times greater than said voltage supplied by said first and second voltage sources.

7. A microstructure as recited in claim 4, wherein said microstucture effects a force transducer upon said first finger.

8. A microstructure as recited in claim 4, wherein said microstucture effects a force transducer upon said second finger.

9. A microstructure as recited in claim 1, said microstructure further comprising an output, said output connected to an opamp circuit having an output, wherein said opamp circuit output provides a signal representative of the relative position between said first and second fingers.

10. A microactuator formed on a substantially planar substrate capable generating an electrostatic force in a direction substantially perpendicular to said substrate, said microactuator comprising:

a stationary comb-finger including a top portion relatively distal from the substrate and a bottom portion relatively proximal to the substrate, said stationary comb-finger capable of supporting a voltage potential between said top and bottom portions; and

a movable comb-finger capable of moving with respect to said stationary comb-finger between said top and bottom portions upon application of a voltage to said movable comb-finger.

11. A microactuator as recited in claim 10, further comprising at least a first voltage source coupled between said top and bottom portions of said stationary finger, and a second voltage source coupled to said movable finger.

12. A microactuator as recited in claim 11, wherein the magnitude of said voltage supplied by said second voltage source is significantly greater than said voltage supplied by said at least

first voltage source.

13. A microactuator as recited in claim 11, wherein said voltage supplied by said second voltage source is approximately 100 volts and said voltage supplied by said at least first voltage source is approximately 10 volts.

14. A comb-finger microactuator as recited in claim 10, a dimension of said stationary finger in a direction perpendicular to the substrate being greater than a dimension of said movable finger in a direction perpendicular to the substrate.

15. A microactuator as recited in claim 10, a dimension of said stationary finger in a direction perpendicular to the substrate being at least one and one-half times greater than a dimension of said movable finger in a direction perpendicular to the substrate.

16. A comb-finger microactuator formed on a substantially planar substrate capable generating an electrostatic force in a direction substantially perpendicular to said substrate, the comb-finger microactuator comprising:

a stationary comb-finger including an upper surface

lying in a plane substantially parallel to said substrate; and

a movable comb-finger including an upper surface lying in said plane in an unbiased position, said movable comb-finger capable of moving with respect to said stationary comb-finger in a plane substantially perpendicular to said substrate upon application of at least a first voltage to said stationary comb-finger and a second voltage to said movable comb-finger.

17. A microsensor formed on a substantially planar substrate comprising:

a stationary finger including a top portion and a bottom portion, said stationary finger capable of supporting a voltage potential between said top and bottom portions;

a movable finger capable of moving with respect to said stationary finger between said top and bottom portions;

at least one modulation voltage source connected between said top and bottom portions of said stationary finger; and

a circuit connected to said movable finger, said

circuit including an output responsive to a change in position between said movable and stationary fingers

18. A microsensor as recited in claim 17, wherein said circuit includes an op-amp configured as a voltage buffer.

19. A microsensor as recited in claim 17, wherein said circuit includes an op-amp and a charge integration capacitor, wherein said circuit forms a charge integrator.

20. A microsensor as recited in claim 17, further including a demodulation circuit.

21. A microsensor as recited in claim 20, further including a low-pass filter.

22. A microsensor as recited in claim 20, wherein said modulation voltage and demodulation circuit operate continuously.

23. A microsensor as recited in claim 20, wherein said modulation voltage and demodulation circuit operate as a sampled-data system.

24. A microsensor as recited in claim 17, further including at least one feedback voltage source coupled between said top and bottom portions of said stationary comb-finger.

25. A microsensor as recited in claim 17, wherein said output responsive to said change in position is frequency multiplexed.

26. A microsensor as recited in claim 17, wherein said output responsive to said change in position is time multiplexed.

27. An assembly for an optical switching array micromachined in a substrate, the assembly comprising:

a mirror for reflecting a signal to one of at least a first and second positions;

a spring member affixed to said mirror for flexibly anchoring said mirror over said substrate;

a microactuator for moving said mirror between said at least first and second position, said microactuator including:

a stationary comb-finger having a top portion relatively distal from the substrate and a bottom portion relatively proximal to the substrate, said stationary comb-finger capable of supporting a voltage potential between

said top and bottom portions; and

a movable comb-finger attached to said mirror, said movable comb-finger and said mirror moving with respect to said substrate in a direction substantially perpendicular to said substrate upon application of a voltage to said movable comb-finger and said stationary comb-finger.

28. An assembly for an optical switching array as recited in claim 27, wherein said movable fingers are offset approximately 180° from said spring mechanism with respect to a center of said mirror.

29. An assembly for an optical switching array as recited in claim 27, further including a second set of movable and stationary fingers wherein said second set of movable and stationary fingers are offset approximately 90° from the first set of movable and stationary fingers.